

Where Do Athletes Come From? Synthesizing Experience and Research in Sport and Athlete Development

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Abstract

The purpose of the presentation is to offer strategies for practical implementation of current sport development research, ranging in scope from athlete development models, talent creation, and physical literacy. These terms will be explained during the presentation and strategies for how they can be used in everyday practices and instructional sessions will be discussed. Research by Ericsson, Gould, Whitehead, and Cotè; Bloom's *Development of Talent Research Project*; Balyi's Long-term Athlete Development (LTAD) framework, and Cotè's Developmental Model of Sport Participation (DMSP) will form the foundation of the talk. Since the coach plays a vital role in inspiring athletes at the very beginning of their sport participation it is important to understand what youth coaches should be doing and how it differs from coaching at the high performance level. Researchers are developing this information but it is not being successfully synthesized for the practitioner. It seems that we suffer from the typical disconnect between science and implementation. This presentation will explain what we know, what it means, and suggest some ideas that might help improve sport development in Malaysia.

Keywords: Long-term athlete development, Developmental Model of Sport Participation, Physical Literacy, talent, deliberate practice, deliberate play

1 What is sport development?

The term 'sport development' has different meanings depending on the context in which it is used. For the purpose of this paper the term refers to the process of creating athletes and how the process can contribute to better performance and the overall increase in the number of active athletes under training at any particular time. The increased number of athletes will result in better training opportunities, better internal competitions, a larger selection pool for national and international teams, and an increase in the number and expertise of coaches, officials, and administrators.

Traditionally sport development has been directed toward high performance or professional endeavors. To truly develop sport at a high level though requires building a base of athletes of all ages who are participating in youth sport activities over long periods. To do this requires an understanding of how youth sport is developed and how athletes at the youth level actually gain skills, develop talent, and move through the various training and competitive stages leading to high performance.

This paper will discuss the elements involved in sport talent creation and how they can be incorporated into youth sport programs. The long-term development of any sport depends on having athletes involved in that sport, thus the starting point to improving overall national sport performance is to create more athletes regardless of ability.

Getting more athletes involved in a sport is only one part of the overall development process but understanding the connection between athlete and sport development is essential to the process. Without athletes there isn't anything to develop and without a mature and

effective sport infrastructure athletes cannot be provided with training and services needed for high performance.

Increasing the pool of athletes in any given sport is only part of the development process though. Other elements include constructing a framework of long-term athlete development, training coaches, recruiting volunteers, providing adequate competition schedules and establishing good governance of sport associations.

2 Physical literacy

The concept of physical literacy is not well known in sport circles. It was first coined by Margaret Whitehead who later defined it in terms of psychosocial elements and well as physical components (2001). It is sometimes used interchangeably with physical education but this is inaccurate. It is more correct to understand the term as a result of various ongoing experiences one of which is an effective physical education program. Physical literacy is best understood as an outcome of a number of experiences, a large part of which includes the physical education process in schools.

To be physically literate means being able to move with poise and confidence across a wide range of activities and while this may not refer directly to sport a physically literate pool of youngsters is essential to sport development. Sport associations may not have direct involvement with physical literacy in the beginning stages but they do have a huge stake in whether youngsters in their country are physically literate.

Many different experiences contribute to an individual becoming physically literate. Early in life parents play a critical role in helping their child to develop basic movement skills. Later, as the child ages, opportunities for play and various physical activities become important to the furtherance of physical literacy. Physical education plays a large role when a child enters school and continued opportunities as children age are important for this attribute to fully develop.

Physically literate individuals tend to be more active throughout their lives and have basic movement skills that will enable them to learn and participate in a variety of culturally appropriate activities. In Malaysia, for example, it's appropriate for youngsters to learn to play football, badminton, or sepak takraw in addition to any number of other sports they may be interested in. These activities help children participate more fully in their culture. In Canada children might need to learn how to ski or skate as part of being culturally educated.

It's easy to overlook the importance of physical literacy to athlete development because sport participation and training are seen as discrete things that simply don't exist outside the sport context. The notion that 4-year-olds, for example, may be preparing for sport participation while playing with friends is difficult to grasp. As such we tend not to consider anything occurring outside of sport as being part of it. Physical literacy nonetheless provides the essential foundational movements used in all sport activities and the more physically literate youngsters are, the higher their potential for athletic success. Physical literacy is the foundation of all high-performance sport.

Physical literacy consists of two basic components: Fundamental movement skills and fundamental sport skills. Fundamental movement skills include such things as running, jumping, throwing, catching, rolling, swimming, and a host of other skills that allow children to move effectively through their environment. The learning of fundamental movement skills is affected by growth and maturation so these skills are not learned all at once but are developed over time. From birth a child should be given a wide range of movement opportunities. It's been suggested that the best time to learn fundamental movement skills is

between the ages of 6 and 11 (Higgs et al., 2010). These skills create a foundation upon which sport expertise can be built.

Fundamental sport skills are those skills needed to actually play a game or perform an activity. Many fundamental movement skills become fundamental sport skills when performed at a higher level although there are sports where some skills are unique, which would also be learned during this period.

Fundamental movement skills and fundamental sport skills provide a repertoire of movements that a youngster can draw upon while learning or practicing sports. It is this foundation that enables a youngster to move elegantly and with confidence and provides a basis for learning new, more complex actions. Without this foundation or with limited acquisition of fundamental skill individuals are still able to participate in sport and recreation but not with the richness of ability necessary for high performance.

3 Frameworks for athlete development

Frameworks for athlete development provide a general understanding of how youngsters become athletes. Two of these frameworks are the *Developmental Model of Sport Participation* (DMSP) (Côté & Vierimaa, 2014) and *Long-Term Athlete Development* (LTAD) (Balyi, Way, & Higgs, 2013). The DMSP is more research based and upon close examination it is clear that the LTAD model takes some of its elements and progression cues from the DMSP. Both models identify pathways in the process and incorporate child growth and maturation into planning.

3.1 Developmental Model of Sport Participation

The DMSP describes two participation pathways from the point when a youngster begins sport participation. Early specialization and sampling are the two ways youngsters begin their participation.

3.1.1 Early specialization

Early specialization is characterized by a high amount of deliberate practice, low amounts of deliberate play, and an exclusive focus on training in only one sport. Deliberate practice is a structured activity with a goal of improving a skill or some aspect of performance (Ericsson, Krampe, Tesch-Romer, 1993; Ford, 2009). Deliberate play is used to describe activities different from deliberate practice where the purpose of the activity is to enjoy playing rather than being focused on improving skills.

Elite performance is one of the possible outcomes of this pathway but so are reduced physical health and reduced enjoyment. Sport participation through the early specialization pathway is becoming more common in youth sports but research indicates that the focus on only one sport and the intensity of participation at young ages can cause chronic injuries and reduced enthusiasm for the activity, both which can lead to burnout or sport dropout (American Academy of Pediatrics, 2000).

3.1.2 Sampling

In the DMSP sampling is defined as youngsters participating in several different sports for a number of years before specializing in any one activity. These sampling years consist of involvement in a number of sports, a low amount of deliberate practice, and high amounts of deliberate play. After the sampling years youngsters can follow another path leading to elite performance or simply continue with recreational participation.

Those who opt to continue towards elite performance go through what Côté refers to as the investment years. During investment the athlete devotes their time to improvement in one sport, similar to early specialization but occurring later. The ratio between deliberate practice and deliberate play is flipped and the focus becomes one of improvement and eventually high performance.

Those choosing the recreational pathway simply continue enjoying their sport participation. There may be some effort to improve skills overtime but elite performance is not the goal.

3.2 Long-term athlete development

The LTAD model (Balyi et al., 2013) uses 7 stages to describe the athlete development process. The stages are progressive in that they build on one another taking developmental periods and growth and maturity milestones into account. There are no explicit performance or recreational pathways as in the DMSP; the LTAD assumes that all athletes will follow the same pathway. When youngsters get to the point where they decide that elite performance is not for them then they can exit the training pathway and continue their sport participation on a recreational level. Because the model was developed primarily to offer better youth sport experiences rather than providing only scientific support for how youth participate in sport the LTAD model itself is not well supported by research yet though it is based on sport and child development research.

Table 1
Long-Term Athlete Development stages

LTAD stage	Chronological age	Partial list of characteristics
Active start	Males and females, 0 to 6 years	<ul style="list-style-type: none"> • Development of general movement skills • Not sedentary for more than 60 minutes except when sleeping • Some organized physical activity
Fundamentals	Males: 6-9 Females: 6-8	<ul style="list-style-type: none"> • Overall movement skills • General, overall development • Integrated mental, cognitive and emotional development • ABCs of athleticism: agility, balance, coordination and speed • ABCs of athletics: running, jumping, throwing and wheeling for wheelchair sports
Learn to train	Males: 9-12 Females: 8-11	<ul style="list-style-type: none"> • Overall sport skills development • Major skill learning stage: all basic sport skills should be learned before entering puberty or the Train to Train stage • Integrated mental, cognitive and emotional development • Sport-specific training three times per week; participation in other sports three times per week

Train to train	Males: 12-16 Females: 11-15	<ul style="list-style-type: none"> • Sport-specific skill development • Major fitness development stage: aerobic, speed and strength • The onset of the growth spurt, peak height velocity (PHV) (the fastest rate of growth after growth decelerates) and the onset of menarche are the biological markers • Build the physical and mental engine
Train to compete	Males: 16-23 +/- Females: 15-21 +/-	<ul style="list-style-type: none"> • Sport-, event-, position-specific physical conditioning • Sport-, event-, position-specific technical tactical preparation • Sport-, event-, position-specific technical and playing skills under competitive conditions • Integrated mental, cognitive and emotional development
Train to win	Males: 19 +/- Females: 18 +/-	<ul style="list-style-type: none"> • Ages are sport-specific and based on national and international normative data, which represents the average score for a certain factor across various levels of performance (height, weight, etc.) • Maintenance or improvement of physical capacities • Further development of technical, tactical and playing skills
Active for life	Can enter at any stage	

Source: Long-Term Athlete Development 2.0 (Balyi, Way, & Higgs, 2014)

In order to offer youth an enjoyable sport experience and an opportunity for high performance the entire sport structure is integrated into the model. This means that coaching, competition schedules, and governance are all addressed. Successful sport experiences cannot be developed unless the entire participation environment is considered. The LTAD encourages sport associations and officials to get involved in changing current practices within their associations and within their sports so that the overall philosophy of the model can be realized.

If one were to compare the DMSP and LTAD models it could be said that the LTAD is a refining of the DMSP stages but also attempts to be more specific in that it describes what the cognitive, social, and physical elements look like at the various stages. As a descriptive model the DMSP is more observational and the LTAD is more of a how-to tool that can be used when designing or reviewing youth sport development infrastructure.

4 Sport talent

“Although talent feels and looks predestined, in fact we have a good deal of control over what skills we develop, and we have more potential than we might ever presume to guess” (Coyle, 2009). Coyle says this to address the widespread belief that talent is an inherent characteristic *i.e.* some people have it, others don’t. This belief is the underpinning of so-called talent identification schemes. However, studies done since the 1980s suggest that

talent is something that can be developed or created given the right set of circumstances (Ericsson, Prietula, & Cokely, 2007, p. 289).

Sometimes talent is masked by various physical attributes that enhance performance. For example, in basketball tall players have an advantage over shorter players but this does not mean that tall players are more talented. It only means that because of the nature of the game those players who are taller or have longer wingspans tend to be more successful.

Coyle defines sport talent as, "...the possession of repeatable skills that don't depend on physical size..." (2009). Based on this definition it is easy to see that many talent identification schemes are based on physical attributes *i.e.* looking for tall students to play on the school's basketball team or something similar. While height is important it is not the same thing as talent. A talented athlete is one who possesses better skills than another. If they also have favorable physical attributes (height or weight for example) or have trained other aspects of physical performance such as strength or stamina then their chance for success is higher than for athletes who either don't possess the favored attributes or have not trained. The level of talent in both players may be the same but success will favor the one with better physical attributes.

This is a critical point about talent identification schemes. If these talent searches are looking merely for athletes who are more successful relative to their peers then they are most likely basing decisions about talent on physical attributes especially if the search is done with young athletes. As athletes age physical attributes become less important due to the self-selecting nature of sport. Athletes at the highest levels are largely similar as far as physical attributes are concerned, thus talent is much more important in older athletes. In younger athletes though physical attributes are more significant factors in performance. Moreover, selecting youngsters who are better relative to their peers may simply mean that the decision is based on relative age effects.

Talent identification schemes are popular because sport associations are attracted by potential competitive advantages that result from the early recruitment of young sports stars. If this kind of search is successful then the money and time used to develop that talent could be more highly focused. But current evidence suggests that identifying individuals at a young age who will become future sport stars is not possible and success in this direction has been elusive. The underlying assumption—that present ability is predictive of future ability—has never been shown to be true.

The Development of Talent Project was conducted at the University of Chicago in the 1980s to find out what the precursors of talent might be and to identify what talent seekers might look for in spotting future talents (Bloom, 1985). The research was based on the assumption that individuals who showed high ability as teens or young adults must have also shown signs of this ability when younger. Bloom wanted to find out what these signs were. However, results of the project did not support the research hypothesis. Instead, Bloom found that environment was the primary catalyst in developing high ability.

Perhaps one of the most famous quotes from Bloom's study is "We were looking for exceptional kids and what we found were exceptional conditions" (as cited in Ericsson, Charness, Feltovich, & Hoffman, 2006, p. 289). This indicates that talent, long believed to be an inherent quality—one an individual is born with—can, instead, be created. The conditions that Bloom referred to included opportunities to learn and practice skills, social and cultural support, and mentoring.

Ericsson, Prietula, and Cokely (2007) built on Bloom's research and noted that expertise is a product of long hours of practice. This was estimated to be about 10,000 hours or about

10 years of deliberate practice. This marked the birth of the ‘10,000 hour rule’ that seems so popular now in the expertise industry. Ericsson’s point though was not to provide a specific target for practice but rather to point out that creating talent takes time.

The chief contribution of this research is that it shows that sport talent identification schemes are chasing ghosts; there is nothing to identify at young ages, and because they deselect more youngsters than they select their effect is to diminish the talent pool unnecessarily. Countries with small populations or underdeveloped sport infrastructure cannot afford to do this and still expect to develop high performing athletes.

4.1.1 Talent selection

Unlike talent identification, talent selection is used successfully around the world to select participants or teams for targeted events. An example of this would be a country selecting its Olympic team through a trials competition or some other structured evaluation process designed to assemble the best competitive team for the event. Talent selection identifies athletes for competition who have already shown high ability in their sport.

The key component of the talent selection process is timing. Participants are selected for a specific competition that occurs on a known date usually in the very near future. The time from selection to targeted competition is short since it’s safe to assume that athletes who are performing well now will still be performing well a short time into the future. Talent selection is the best way that associations and countries have to identify their best athletes for short periods of time. However, talent selection does not work if the selection process occurs too far ahead of the target competition.

In individual sports the selection process and target competition should be very close together, usually between 2 to 4 weeks depending on the sport. In team sports the selection might occur as far as a year out from the target competition to allow all the usual team dynamics to develop prior to the big event. There is a fair amount of variability in these ranges though and sport associations usually experiment with both shorter and longer periods.

Talent selection is a valid and sensible method for choosing competitive teams for important competitive events.

4.1.2 Talent identification

Talent identification is the process of identifying youngsters who may become elite athletes in the future (Vaeyens, 2008). Despite the popularity of talent identification schemes though there has so far been no research that supports the idea that identifying future talent at young ages is possible. However this has not deterred sport associations and even countries from developing elaborate talent identification projects.

Although there are many different ways that a talent identification program can be carried out the easiest way is to simply select youngsters from a pool of athletes who show higher abilities than their peers. Unfortunately, this has the effect of deselecting youngsters who simply may not have matured as fast as those who appear to have higher ability.

At play in this process is the relative age effect, which refers to the difference in age between youngsters born early in the year compared to those born later on. Children born in January, for example, are usually bigger, stronger, and faster than those born in December. Chronologically both youngsters are the same age for sport purposes since they are born in the same year but differences in strength, speed, and other performance criteria between two 8-year-olds can be large. It is this relative difference in age that favors those born early in the year (or whatever the selection period is) over those born later because they usually show

higher ability and thus are selected for more and better training opportunities, attention from coaches, and the social support needed for continued improvement (Price, 2013, August).

Also confounding the identification process is the rate at which youngsters mature. At young ages early-maturers usually have better physical performances than late-maturers, but this only lasts for a short time. As the late-maturers begin to catch up with the early-maturers in terms of size, strength, speed, and skills this difference is slowly reduced until it eventually disappears. Later on, late-maturers frequently surpass the early-maturers because they have had time to develop better skills. Late maturing athletes tend to get more deliberate practice because it is their best strategy in dealing with the early maturing athletes. Late maturing athletes can't keep up with the early-maturers due to their temporary lower physical abilities but they can practice skills just as well anyone else and this is what many of them do.

Because of the way many sport programs are structured late maturing athletes are not encouraged to remain involved in sport largely because they are seen as untalented. This is truly unfortunate because there are many stories of high performing athletes who matured late or who didn't even begin their sport involvement until their late teens.

5 The coach's role in sport and athlete development

The coach's role in sport development is usually seen as technical, teaching skills and training athletes to perform as best they can. But closer reading of Bloom and Ericsson suggest that coaches are the primary force behind getting youngsters involved in sport, keeping them involved long enough to make a difference, and providing the spark of ignition that some athletes will use to fully develop their talents (Coyle, 2009). In other words, they are the primary creators of talent in sport. This is the coach's role as there is no one else within the sport structure that is in a position to do this.

The key to high performance sport is long-term participation. In an effective sport development system the primary job of a youth coach is to ignite a passion for the sport in his athletes. Developmental coaches don't have to be technical experts or even former athletes but they do have to know how to get athletes interested and keep them involved long enough to make a difference. A successful youth coach is one who can teach fundamental sport skills and make the practice sessions interesting, challenging, and fun so that athletes want to come back the next day, learn new skills, and improve those they already possess. Coaches who are consistently able to get athletes back day after day are the ones who are creating talent. *If there is one key factor that stands above all the others in talent development it is the length of time that an individual is involved in an activity.*

Sport associations now recognize the need for educated coaches. Coaching itself is becoming more accepted as an attractive profession and as the sport industry grows in Malaysia coaches will play an increasingly important role in the future of the country's sport efforts, but only if coaches understand their role in the development process. Strategies to create more and better coaches though are usually limited to high performance sport. There is still much to do for coaches at the youth level.

6 Synthesis

The LTAD and DMSP models offer coaches and sport associations a framework for sport development programs. Sport associations can help create these structures and then maintain them through training for officials and coaches and education for parents of young athletes. Athletes come from thoughtful efforts by sport associations, officials, coaches, teachers, and parents to create effective conditions for children to get an active start in life, learn various

sport skills, have knowledgeable mentors, and realize whatever potential abilities they may have.

Some sport associations are not strong enough to implement either of these frameworks within their sport ecosystem. Thus, many practice and competitive situations rely on the professional sport model for guidance. Indeed, many people are involved with youth sport because of their prior sport experience and the methods and philosophies they use when teaching or coaching youngsters will be similar to what they remember from when they were athletes or what they see on television or read in the press. Youngsters are not merely small adults but without a clear framework in which youth sport can be conducted they are frequently treated as adults.

The professional sport model is the one most people are familiar with. As a professional, sport is a job, which has reciprocal obligations. Winning is desired; losing has consequences; performance is all that matters. Applying a professional model in a youth sport setting is inappropriate and counterproductive to what officials may think they are developing. Sport associations must be careful not to allow this model to infiltrate their youth development projects. While it is certainly appropriate at the professional level it stifles development at the youth level.

Sport associations that focus on getting as many youngsters involved in the sport as possible, keep them involved for as long as possible, and create an environment where opportunities and competitions are numerous and available to all will end up creating a large talent pool. Creating talent takes time so the more athletes an association has in training and the longer athletes are involved in the sport the more elite athletes will be produced.

When selecting local and state teams some provision to allow those not selected to continue their training and participation in the sport should be made. De-selection that leads to loss of participation opportunities reduces the talent pool and should be avoided. Late maturing athletes are usually victims of the de-selection process.

Coaching education needs to be a priority at the youth level to help coaches understand their role in the athlete development process. Too often coaching education is directed at high performance. Realistically very few coaches are working with high performing athletes. The majority of coaches are coaching children and teens so the approaches used in teaching skills and creating the environment where a youngster's passion for the activity can be ignited are important skills for a coach to have. Coaches need to understand their role in national sport development.

Selection of teams for limited competitions, in schools for example, often means that young athletes have one shot to prove their abilities. Not being selected in a one-shot trial often means that that youngster will never be selected and may simply drop out of sport altogether.

Youth need opportunities to play, learn, and compete in their chosen activities regardless of whether they show talent or not. Selecting athletes at young ages because they show better ability than their peers unnecessarily shrinks the talent pool for future high performance. Since children mature at varying rates there really is no way to determine whether a 10-year-old who shows good sport ability is doing it because he is simply maturing faster than his peers or if he truly has sport talent (Price, 2013). Youth selected early because of early signs of ability may or may not ever develop a real passion for the sport, which is so essential for high performance thus making their early selection a waste of resources. Likewise those deselected at early ages may lose interest in the activity and never develop the spark that would have led to elite level performances if only they were able to participate longer. This is

a waste of resources of a much different kind. Anything that limits opportunity is counter-productive to sport development.

Variations of the adult model are used at all levels. The success of these variations depends on the knowledge and experience of coaches and administrators conducting youth sport activities. Unfortunately the number of coaches with adequate knowledge of athlete development is small thus many youth sport development programs are conducted using the adult model. This model is inappropriate for youth sport activities.

Efforts made to develop sport need to consider all athletes, especially those at the lowest levels because these are the youngsters who will eventually become the high performers of tomorrow. Developing large numbers of athletes at this level is not easy though. Creating environments where youngsters can learn, practice, and later develop a passion for the sport is a task that requires effort on the part of all players in the sport administration process.

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